

Remarks/Arguments

By this Amendment, claims 1 and 2 are amended, and thirteen (13) claims remain pending, with claim 1 being the lone independent claim. In light of the three months of extension being requested, Applicant expects a fee of \$555 to be due, which is being paid electronically with submittal of this Amendment. If the Office deems any additional fees to be necessary for entry of this Amendment, the Office is authorized to charge such fees to Deposit Account No. 061910.

Claim Rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a)

In the Office Action, each of claims 1-13 is rejected by the Examiner. In particular, under § 102(b), claims 1 and 3 are rejected as being anticipated by U.S. Patent No. 6,030,431 to Deloche et al. (hereinafter “Deloche”). Additionally, under § 103(a), claims 2 and 4-13 are rejected, with (i) claims 2 and 11-13 viewed as being unpatentable over Deloche, (ii) claim 4 viewed as being unpatentable over Deloche in view of JP 01219116 to Tanioku et al. (“Tanioku”), (iii) claims 5 and 6 viewed as being unpatentable over Deloche in view of U.S. Patent No. 5,702,502 to Kundrat et al. (“Kundrat”) and U.S. Patent No. 4,334,921 to Hirai et al. (“Hirai”), (iv) claims 7 and 8 viewed as being unpatentable over Deloche in view of U.S. Patent Application Publ. 20020088102 to Stercho, and (v) claims 9 and 10 viewed as being unpatentable over Deloche in view of U.S. Patent No. 4,908,059 to Hikosaka et al. (“Hikosaka”).

Applicant respectfully disagrees with the standing rejections. In particular, the method claimed in the instant application is neither anticipated, nor rendered obvious, by Deloche’s teachings. Further, none of the other references (Tanioku, Kundrat, Hirai, Stercho, or Hikosaka), taken separately or used in combination, address Deloche’s deficiency. Moreover, as detailed below, claim 1 is hereby amended to further clarify the nature of the claimed method.

Applicant is amending claim 1 to explicitly require that the hot blast be supplied from the top wall of the vessel in which the scrap bulk is being melted. Specifically, claim 1 is amended so as to require that the scrap bulk is “within a vessel having side and top walls” and the “hot blast is supplied to the scrap bulk from said top wall.” Support for this amendment can be found, for example, in paragraphs [0010], [0011], [0014], and [0037] of Applicant’s published application, as well as in Figure 1 of the application.

In connection with melting the scrap bulk after the channel formation, Deloche teaches the importance of bringing as much energy as possible into the channel (col. 3, lines 25-27). In order to accomplish this, Deloche teaches two embodiments where gas injection nozzles are positioned in the upper side walls of an electric arc furnace (col. 3, line 41 – col. 4, line 2). Deloche's first embodiment uses three injection nozzles installed in the upper area of the side walls (col. 3, lines 41-43), with the nozzles arranged in a downward slant at an angle of approximately 10° such that they blow into the space between the furnace wall and electrodes (col. 3, lines 52-55). For this embodiment, Deloche further teaches that the gas injection nozzles may be installed anywhere in the upper area of the side walls of the electric furnace as long as they are installed at least 30 cm above the bath surface, or when using oxygen, at least 80 cm above the bath surface (col. 3, lines 61-64). In Deloche's second embodiment, two hot draft jets blowing in opposite directions are used at three injection sites in the upper side walls, yielding an electric furnace with a total of six injection jets (col. 4, lines 3-8).

Deloche does not contemplate a hot blast being supplied to the scrap bulk from the top wall of the vessel (as is required by amended claim 1). Instead, Deloche has in mind providing the gas introduction nozzles anywhere along the upper areas of the furnace's side walls. The Examiner fairly admits this deficiency (at the top paragraph on page 4 of the Office Action). The Examiner, however, contends that based on the teachings of Deloche (in particular, the last full paragraph of column 3), it would have been obvious to a person of ordinary skill in the art to locate the hot blast supply centrally from the top. Applicant respectfully disagrees for two reasons.

First, Deloche's embodiments and primary teachings focus on electric furnaces. The roof of an electric furnace must be pivoted from the furnace body in order to fill the furnace with scrap. As a consequence, the construction of nozzles into the roof of the furnace becomes far more complex. Skilled artisans would therefore not have wished to locate injection nozzles on the roof of an electric furnace unless they had a strong motivation to do so. The Deloche reference teaches that entirely acceptable results are obtained by providing the nozzles on the sidewalls. Skilled readers of this art, therefore, would have clearly wished to avoid the complications associated with incorporating such nozzles into the roof of the furnace.

Second, the Applicant has discovered unexpected results that occur when, instead of using nozzles on the upper side walls, the hot blast is supplied from the top wall in particular.

Contrary to Deloche's teachings, considerable limitations result from locating the nozzles in the upper sidewalls. Specifically, the resulting flow conditions of the hot blast jets are nearly horizontal, and this has been found to cause an undesirable stack-effect in the furnace. In particular, a chimney is formed, such that the center of the scrap bulk becomes molten and a great deal of heat escapes upwardly through this chimney (e.g., hot off-gases leave the scrap bulk through this chimney and hardly any energy is supplied to the scrap). As a result, only the scrap in the center of the vessel becomes molten, and an unmolten outer ring of scrap remains within the furnace. This drawback is described in detail at paragraph [0007] of Applicant's published application.

Applicant surprisingly discovered that this problem can be overcome by providing a hot blast directed into the scrap bulk from the top (see paragraph [0010] of Applicant's published application). The top hot blast causes a gas stream (in the scrap bulk) that uses the energy of the gases particularly well and melts the scrap at the sidewalls in a fast and highly effective manner. Surprisingly, the problems associated with the stack-effect are eliminated by having the hot blast blow onto the scrap bulk from the top wall. The Office Action contends that, due to Deloche's teachings about the nozzles being located at least a certain distance above the bath surface, it would have been obvious to locate the nozzles anywhere within the furnace above the specified height (e.g., on the sidewalls or on the roof). As already explained, Applicant respectfully disagrees with this line of reasoning, since the difficulties associated with incorporating nozzles into the roof of an electric furnace would have deterred skilled artisans from roof-mounting such nozzles absent a compelling incentive to do so. Moreover, the Applicant has surprisingly discovered unexpected results to occur when the hot blast is blown onto the scrap bulk from the top wall in particular.

Thus, it is apparently the Office's initial position that the disclosure of Deloche contemplates either the upper side walls or the top wall as being acceptable locations for hot blast nozzles. As already explained, Applicant respectfully disagrees since the difficulties of incorporating nozzles into the roof of an electric furnace are considerable. Moreover, even if the Office's initial position were adopted for the sake of argument, there clearly is no recognition whatsoever in Deloche about the critical benefits that can be achieved when the hot blast blows onto the scrap bulk from the top wall. The claimed method, therefore, provides results that clearly would have been unexpected from the teachings of Deloche. These unexpected results, in

fact, offer such a marked improvement over the prior art that the drawbacks of having to incorporate injection nozzles into the pivoting roof of an electric furnace are more than overcome.

None of Tanioku, Kundrat, Hirai, Stercho, or Hikosaka, either taken separately or used in combination, remedy the deficiency of Deloche. Thus, there is no combination of Deloche and Tanioku, Kundrat, Hirai, Stercho, and/or Hikosaka that can establish a prima facie case of obviousness.

Accordingly, Applicant believes that upon entry of this Amendment, the claims will be in condition for allowance. Claim 1 has been amended, placing it in allowable form. The allowance of amended claim 1 thereby renders claims 2-13 allowable. Favorable consideration and prompt allowance of the application are respectfully requested.

Conclusion

Applicant believes that no new matter will be introduced by entry of these amendments and that the amendments are fully supported by the specification and application as a whole. Applicant has amended the claims solely to advance prosecution and to obtain the allowance of claims at the earliest possible date. No admission should be inferred by these amendments.

In light of the above, Applicant respectfully submits that the present rejections should be withdrawn. Prompt allowance of this application is therefore respectfully requested. If the Examiner feels that prosecution of the present application can be advanced by a telephonic interview, the undersigned would welcome a call at the number listed below.

Respectfully submitted,

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